

NON-PUBLIC?: N
ACCESSION #: 9403140211
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Vogtle Electric Generating Plant - Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000425

TITLE: AUTOMATIC REACTOR TRIP DUE TO TURBINE TRIP RESULTING
FROM
TRIP OF SWITCHYARD BREAKERS
EVENT DATE: 01/07/94 LER #: 94-001-00 REPORT DATE: 02/01/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Mehdi Sheibani, Nuclear Safety and TELEPHONE: (706) 826-3209
Compliance

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On January 7, 1994, at 2253 EST, the Unit 2 reactor automatically tripped as a result of a generator/turbine trip. The initiating event for this reactor trip was the operation of a differential relay on a shunt reactor in the high voltage switchyard (HVS) which resulted in the trip of two 500 kV air blast circuit breakers (ACB), one of which is the Unit 2 main generator ACB. After operation, the two ACBs had low air pressure indications which served as a permissive in the breaker failure protective relaying scheme. This resulted in simultaneously tripping of the back-up breakers, including the remaining Unit 2 main generator ACB. The shunt reactor was removed from service pending further testing and analysis. With air pressure restored to normal levels, the breakers operated properly. The main generator ACBs were returned to service, allowing unit startup to commence.

The causes of this event were the operation of a differential relay on a shunt reactor and the failure of the 500 kV ACB compressed air refill pressure system switches to operate properly and maintain adequate air pressure prior to breaker tripping. This activated a breaker failure protective relaying scheme which tripped back-up breakers including the remaining Unit 2 main generator ACB and, ultimately, tripped the turbine and reactor. A loss of off-site power (LOSP) did not occur and the safety busses remained energized throughout the event.

END OF ABSTRACT

TEXT PAGE 2 OF 4

A. REQUIREMENT FOR REPORT

This report is required per 10 CFR 50.73 (a)(2)(iv) because an unplanned actuation of the reactor protection system (RPS) occurred.

B. UNIT STATUS AT TIME OF EVENT

At the time of the event, Unit 2 was operating in Mode 1 (Power Operation) at 100 percent of rated thermal power. Other than that described herein, there was no inoperable equipment which contributed to the occurrence of this event.

C. DESCRIPTION OF EVENT

On January 7, 1994, at 2253 EST, the Unit 2 reactor automatically tripped as a result of a generator/turbine trip. The reactor protection system (RPS) actuated as designed and control room personnel responded appropriately to the event. Auxiliary feedwater actuated to supply the steam generators when the main feedwater system isolated. The initiating event for this reactor trip was the operation of a differential relay on a shunt reactor in the high voltage switchyard (HVS) which resulted in a trip signal to two 500 kV air blast circuit breakers (ACB), one of which is a Unit 2 main generator ACB. After operation, the two ACBs had low air pressure indications which served as a permissive in the breaker failure protective relaying scheme. This resulted in simultaneously tripping back-up breakers, including the remaining Unit 2 main generator ACB. The shunt reactor was removed from service pending further testing and analysis. With air pressure restored to normal levels, the breakers operated properly. The main generator ACBs were returned to service, allowing the restoration of the transmission system and commencement of unit startup operations.

D. CAUSE OF EVENT

The cause of the initiating switchyard event was an open circuit to the primary differential relay from the current transformer (CT) connected to the neutral side of the shunt reactor. This conclusion is based on the following:

a) A loose connection was discovered in the secondary of a CT on the neutral side of the shunt reactor.

TEXT PAGE 3 OF 4

b) Neither the secondary differential scheme nor the shunt reactor's fault pressure device was activated.

c) Doble testing, oil sample analysis, and visual inspection of the shunt reactor indicated no physical damage.

d) Switchyard fault recorders indicated no abnormal voltage or current levels prior to the trip.

The cause of the Unit 2 turbine/generator and reactor trip was failure of the 500 kV ACB compressed air refill system pressure switches to operate properly and maintain adequate air pressure prior to the breakers tripping. When the 500 kV ACB low air pressure was sensed along with a valid trip signal, a breaker failure protective relaying scheme simultaneously tripped the back-up breakers including the remaining Unit 2 main generator ACB. Each breaker will automatically trip when the low air pressure setpoint is reached. However, the breaker failure protective relaying scheme did not rely on this low air pressure "fail-safe" feature. Other activations of the breaker failure relaying scheme utilize a time delay and circuit breaker position indication to verify an actual breaker failure before initiating backup breakers to trip. Therefore, a contributing cause of this event was an overly conservative switchyard circuit breaker low air pressure breaker failure protective relaying design scheme which did not verify an actual breaker failure, but anticipated the possible breaker failure and caused an unnecessary trip of the additional breakers and ultimately the turbine/generator and reactor trip.

E. ANALYSIS OF EVENT

The RPS actuated as designed and control room personnel responded appropriately to the event. Auxiliary feedwater actuated to supply the steam generators when the main feedwater system isolated.

The shunt reactor involved in the differential relay operation is utilized for additional reactive power, i.e. voltage control, but is not required for unit operation or grid stability. The switchyard protective relaying scheme operated per design and isolated the possible fault and potential malfunctioning breakers. Only one 500 kV transmission line to Vogtle tripped, while a total of 6 transmission lines remained in service (one 500 kV and five 230 kV lines). A loss of off-site power (LOSP) did not occur and the safety busses remained energized throughout the event.

Based on these considerations, there was no adverse effect on plant safety or on the health and safety of the public as a result of this event.

TEXT PAGE 4 OF 4

F. CORRECTIVE ACTIONS

1. Monitoring of the switchyard 500 kV ACB air compressor system was increased until repairs and modifications were initiated.
2. The loose connection found in the CT was tightened and the relay tested to ensure proper operation.
3. The 500 kV low air pressure breaker failure protective relaying scheme was modified to utilize a time delay and verify both primary breaker position and the presence of fault current before initiating backup breakers to trip.
4. A review of the design adequacy and maintenance practices of the switchyard 500 kV compressed air system will be completed by February 18, 1994, and the appropriate follow up actions implemented.

G. ADDITIONAL INFORMATION

1. Failed Components:
None

2. Previous Similar Events:
None

3. Energy Industry Identification System Code:
EL - Main Generator Output Power System
FK - Switchyard System

AB - Reactor Coolant System
BA - Auxiliary Emergency Feedwater System (PWR)
SJ - Feedwater System
TA - Main Turbine System
TB - Main Generator System

ATTACHMENT TO 9403140211 PAGE 1 OF 1

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C. K. McCOY
Vice President, Nuclear
Vogtle Project
Georgia Power
the southern electric system

February 1, 1994

LCV-0276

Docket No. 50-425

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Ladies and Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
LICENSEE EVENT REPORT
AUTOMATIC REACTOR TRIP DUE TO TURBINE TRIP
RESULTING FROM TRIP OF SWITCHYARD BREAKERS

In accordance with the requirements of 10 CFR 50.73, Georgia Power Company submits the enclosed report related to an event which occurred on January 7, 1994.

Sincerely,

C. K. McCoy

CKM/AFS

Enclosure: LER 50-425/1994-001

xc: Georgia Power Company

Mr. J. B. Beasley, Jr.

Mr. M. Sheibani

NORMS

U. S. Nuclear Regulatory Commission

Mr. S. D. Ebnetter, Regional Administrator

Mr. D. S. Hood, Licensing Project Manager, NRR

Mr. B. R. Bonser, Senior Resident Inspector, Vogtle

*** END OF DOCUMENT ***
